

REMARKS

Applicants appreciate the Examiner's thorough consideration provided the present application. Claims 9-28 are now present in the application. Claims 9 and 14 have been amended. Claims 22-28 have been added, which are drawn to the elected Group I. Claims 1-8 have been withdrawn and hereby cancelled. Claims 9, 14, 27 and 28 are independent. Reconsideration of this application, as amended, is respectfully requested.

Allowable Subject Matter

The Examiner has indicated that dependent claims 15 and 16 would be allowable if rewritten to include all of the limitations of the base claim and any intervening claims. Applicants greatly appreciate the indication of allowable subject matter by the Examiner.

By the present amendment, claims 15 and 16 have been rewritten in independent form as independent claims 27 and 28. Accordingly, it is believed that claims 27 and 28 are in condition for allowance.

Claim Rejections Under 35 U.S.C. §§ 102 & 103

Claims 9, 10, 12-14, 17, 18, 20 and 21 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Matsuo, U.S. Patent Application Publication No. US 2002/003638. Claims 9, 10, 13, 14, 18 and 21 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Moden, U.S. Patent No. 6,297,548. Claims 11 and 19 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Matsuo. Claims 11 and 19 stand rejected under 35 U.S.C. § 103(a) as being

unpatentable over Moden. Claims 12 and 20 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Moden in view of Matsuo. These rejections are respectfully traversed.

In light of the foregoing amendments to the claims, Applicants respectfully submit that these rejections have been obviated and/or rendered moot. As the Examiner will note, independent claims 9 and 14 have been amended to recite a combination of elements including “a plurality of stud bumps are formed on the supporting surface by a stud bump process and contact the supporting surface”. Support for the above combination of elements can be found in FIGs. 1A and 2A as originally filed. Applicants respectfully submit that the above combination of elements as set forth in amended independent claims 9 and 14 are not disclosed nor suggested by the references relied on by the Examiner.

Matsuo discloses a stacked type semiconductor device including a substrate BS, a plurality of thorough plugs TP, and a plurality of LSI chips S1-S5 (see FIGs. 1A-C and 12). The Examiner referred to the thorough plugs TP as the stud bumps of claims 9 and 14. However, Matsuo’s thorough plugs TP are merely located within the vias of the LSI chips S1-S5 and fail to contact the surface of the substrate BS (see FIGs. 1A-C and 12). Therefore, Matsuo fails to teach “a plurality of stud bumps are formed on the supporting surface by a stud bump process and contact the supporting surface” as recited in amended claims 9 and 14.

Moden discloses a stackable ceramic FBGA including a substrate 2, a plurality of carriers 112 with apertures 160, a plurality of conductive materials 162 filled in the apertures 160, and a plurality of semiconductor dies 114 held by the carriers 112 (see FIG 5). The Examiner referred to the conductive materials 162 as the stud bumps of claims 9 and 14. However, as shown in FIG 5 of Moden, the conductive materials 162 are merely filled in the apertures 160 and fail to

contact the surface of the substrate 2. Therefore, Moden fails to teach “a plurality of stud bumps are formed on the supporting surface by a stud bump process and contact the supporting surface” as recited in amended claims 9 and 14.

Accordingly, neither of the references utilized by the Examiner individually or in combination teach or suggest the limitations of amended independent claims 9 and 14 or their dependent claims. Therefore, Applicants respectfully submit that claims 9 and 14 and their dependent claims clearly define over the teachings of the references relied on by the Examiner.

Accordingly, reconsideration and withdrawal of the rejections under 35 U.S.C. §§ 102 and 103 are respectfully requested.

Additional Claims

In addition to new independent claims 27 and 28, additional claims 22-26 have also been added for the Examiner’s consideration.

Claim 22 recites “each of the stud bumps has a bottom wider than a width of the corresponding via”. Claim 24 recites “each of the stud bumps has a bottom wider than a width of the corresponding vias of the plurality of electronic elements”. Support for the above recitations can be found in FIGs. 1C and 2B. Since Matsuo’s thorough plugs TP and Moden’s conductive materials 162 are located within the plugs or the apertures 160, the bottom width of the thorough plugs TP or conductive materials 162 is smaller or equal to the width of the plugs or the apertures 160. Therefore, Matsuo and Moden fail to teach the above recitations of claims 22 and 24.

Claim 23 recites “each of the stud bumps protrudes from a top surface of the electronic element”. Claim 26 recites “the plurality of electronic elements are stacked from bottom to top as a stack structure, and each of the stud bumps protrudes from a top surface of the topmost electronic element of the stack structure”. Support for the above recitations can be found in FIGs. 1C and 2B. Since Matsuo’s thorough plugs TP and Moden’s conductive materials 162 are located within the plugs or the apertures 160, the thorough plugs TP or conductive materials 162 do not protrudes from a top surface of Matsuo’s LSI chips S1-S5 or Moden’s assembly 100. Therefore, Matsuo and Moden fail to teach the above recitations of claims 23 and 26.

Claim 25 recites “the plurality of electronic elements are stacked from bottom to top as a stack structure, and each of the stud bumps has a height larger than a height of the stack structure”. Support for the above recitations can be found in FIG. 2B. Since Matsuo’s thorough plugs TP and Moden’s conductive materials 162 are located within the plugs or the apertures 160, the height of the thorough plugs TP or conductive materials 162 is smaller or equal to the height of the stacked structures. Therefore, Matsuo and Moden fail to teach the above recitations of claims 25.

Favorable consideration and allowance of additional claims 22-28 are respectfully requested.

CONCLUSION

It is believed that a full and complete response has been made to the Office Action, and that as such, the Examiner is respectfully requested to send the application to Issue.

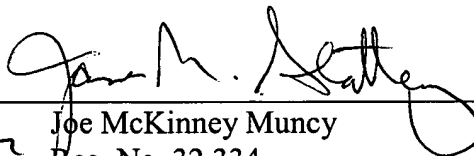
In the event there are any matters remaining in this application, the Examiner is invited to contact Joe McKinney Muncy, Registration No. 32,334 at (703) 205-8000 in the Washington, D.C. area.


Pursuant to 37 C.F.R. §§ 1.17 and 1.136(a), Applicants respectfully petition for a one (1) month extension of time for filing a response in connection with the present application and the required fee of \$120.00 is attached herewith.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§1.16 or 1.17; particularly, extension of time fees.

Respectfully submitted,

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